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Docket No. AUS9-2000-0371-US1

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:
Transmitted herewith for filing is the patent application of Inventor(s):

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For: **METHOD AND APPARATUS FOR PERFORMING PERSONALIZATION BASED ON CLASSIFICATION**

Enclosed are also:

X	30	Pages of Specification including an Abstract
X	5	Pages of Claims
X	10	Sheet(s) of Drawings
X		A Declaration and Power of Attorney
X		Form PTO 1595 and assignment of the invention to IBM Corporation

CLAIMS AS FILED

FOR	Number Filed		Number Extra		Rate		Basic Fee ($690)
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Respectfully,

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Docket No. AUS9-2000-0371-US1

METHOD AND APPARATUS FOR PERFORMING PERSONALIZATION
BASED ON CLASSIFICATION

5   CROSS REFERENCE TO RELATED APPLICATION

The present invention is related to applications entitled "Method and Data Processing System for Specifying and Applying Rules to Classification-Based

10   Decision Points in an Application System", U.S. Patent Application No. 09/204,970, Attorney Docket No. AT9-98-287, filed on December 3, 1998; "Method And Apparatus For General Integrity Rule Checking Point In An Application", U.S. Patent Application No. 09/204,971,

15   Attorney Docket No. AT9-98-267, filed on December 3, 1998; "Method And Apparatus For Applying Business Rules In An Object Model Driven Context", U.S. Patent Application No. 09/204,973, Attorney Docket No. AT9-98-266, filed on December 3, 1998; "Managing Business

20   Rules and Using Jurisdiction", U.S. Patent Application No. 09/134,341, Attorney Docket No. AT9-97-504, filed August 14, 1998; and "Method and Apparatus for Identifying Applicable Business Rules", U.S. Patent Application Serial No. 09/993,718, Attorney Docket No.

25   AT9-97-503, filed on December 18, 1997, which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

30   1.   Technical Field:
The present invention relates generally to an improved data processing system and in particular to an improved method and apparatus for managing a business

Docket No. AUS9-2000-0371-US1

system using classifications. Still more particularly, the present invention relates to an apparatus and method for specifying the dynamic content to be associated with a user of an application, based on characteristics of the
5   user.

2.   **Description of Related Art:**
As businesses increasingly migrate to the Internet, the ability to provide users with an interactive
10   experience that is interesting and easily interfaced with has become more important. Some business Web sites, for example, fail to even attract the casual visitor while others may attract the casual visitor but fail to retain them as the Web site may be too cumbersome for the casual
15   visitor to use. These failures to attract and keep the casual visitor result in lost business opportunities.
One way in which businesses attempt to combat this problem is to make their Web sites and Internet applications more personalized to the particular user
20   using information that is known or gathered and retained about the user and his encounter with the business application. The conventional way in which this personalization is performed is using a decision engine that takes user information and generates personalized
25   content and/or function. The decision engine is frequently a rules engine that makes use of a plurality of nested *if-then-do* decision rules to determine what content/functions should be provided to the particular user.
30   When a personalization task is to be performed using this conventional decision engine, all of the rules in the decision engine must be executed. The ones whose *if*

Docket No. AUS9-2000-0371-US1

part evaluates to *true*, result in the *do* part being executed. Those that evaluate to *false* are ignored. The *do* part of the final rule in the chain frequently selects, orders or filters content, or performs some

5 function, usually asynchronously, such as sending an acknowledgement electronic mail, or the like. In some implementations, the *do* parts may change the conditions tested in the *if* parts, causing the set of rules to be iteratively recalculated.

10   With the above approach, it is never very clear which of the actions are going to be taken at any given time, given a set of non-overlapping circumstances. While some of the ambiguity could be resolved by combining sets of conditions into compound if parts, this

15 frequently yields an explosion in the number of rules. For example, *Rule 1* specifies what to do when parts *a*, *b*, *c* are all *true*; *Rule 2* specifies what to do when parts *a* and *b* are true, but part *c* is *false*; *Rule 3* specifies what to do when part *a* and *c* are *true*, but part *b* is

20 *false*, and so on.

    Because it is not very clear which of the actions are going to be taken at any given time, if business conditions change and a change to the decision engine is required, it becomes very difficult to determine which

25 decisions need to be changed. If further becomes difficult to determine how the change in one decision will affect other decisions in the decision engine. Thus, an analyst is required to trace all of the possible decisions to determine if the decision engine will work

30 properly under all possible conditions.

    Furthermore, with the conventional decision engine, all of the rules in a rule set are at least partially

Docket No. AUS9-2000-0371-US1

executed (their *if* parts), as described above, even when many of the conditions do not remotely apply. This results in a performance degradation because rules that will result in a false determination will be executed and

5 computing cycles will be wasted.

Thus, it would be beneficial to have a method and apparatus for performing personalization based on classification in which changes in decision rules may be performed relatively effortlessly and in which only the

10 decisions necessary for a particular classification are executed.

Docket No. AUS9-2000-0371-US1

SUMMARY OF THE INVENTION

The present invention provides a method and
5   apparatus for personalizing information content for
delivery to a requesting user. With the method and
apparatus of the present invention, a set of actions
needed to retrieve and organize requested content for a
particular content request are selected and executed
10   based on the concept of classifying the current
situation, e.g., the requesting user attributes and the
current system setting, along any number of predefined
dimensions. The definition of what dimensions of
classification there are and what distinctions are drawn
15   during the process of classification is defined by the
business application administrator.

Once a classification definition is in place, it may
be used and reused, along with other classifications, to
be associated with actions that select the appropriate
20   content. In order to describe what actions to take under
a variety of business conditions, an administrator
chooses a classifier to be used to assess the business
situation, selects the relevant classifications and
associates one or more actions with each classification
25   to be invoked by a selector.

Thus, the present invention provides a mechanism by
which personalization of content and functionality may be
performed without having to traverse large if-then-do
based decision chains. This is due to the
30   compartmentalization of the business application into
selector objects, classifier objects, and action objects.
Only those classifier objects invoked by the selector
object are traversed. Similarly, only those action

Docket No. AUS9-2000-0371-US1

objects corresponding to an applicable classification are
executed.

The mechanism of the present invention allows for
ease of modification by modifying only those objects that
5   are necessary to implement the desired business logic.
Thus, a single action object may be modified in order to
make a modification in the way a plurality of selector
objects operate.

The impact of the modification on other sections of
10 the business application can be easily discerned by
identifying the selector objects that invoke the modified
objects. Thus, for example, it can be determined that a
change in an action object will affect the operation of
multiple selector objects and thus, if the affect on one
15 or more of these selector objects is unwanted, a new
action object may be generated to compensate for the
unwanted operation.

Docket No. AUS9-2000-0371-US1

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the
5   invention are set forth in the appended claims. The
invention itself, however, as well as a preferred mode of
use, further objectives and advantages thereof, will best
be understood by reference to the following detailed
description of an illustrative embodiment when read in
10 conjunction with the accompanying drawings, wherein:

Figure 1 is an exemplary diagram illustrating a
distributed data processing system in which the present
invention may be implemented;

Figure 2A is an exemplary diagram illustrating a
15 server data processing system in which the present
invention may be implemented;

Figure 2B is an exemplary diagram illustrating a
client data processing system in which the present
invention may be implemented;

20 **Figure 3** is an exemplary diagram illustrating the
object architecture in accordance with the present
invention;

Figure 4 is an exemplary diagram illustrating the
operational functions of a selector object in accordance
25 with the present invention;

Figure 5 is an exemplary diagram illustrating a
personalization tool in accordance with the present
invention;

Figure 6 is an exemplary diagram illustrating a
30 classification definition in accordance with the present
invention;

Figure 7 is an exemplary diagram illustrating an

Docket No. AUS9-2000-0371-US1

Always object definition in accordance with the present invention;

Figure 8 is a flowchart outlining an exemplary operation of the present invention when defining a

5 business application; and

Figure 9 is a flowchart outlining an exemplary operation of the present invention when classifying a request from a user.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention provides a method, apparatus,

5   and instructions for specifying, applying and managing business classifications for identifying actions to be performed to generate personalized content and/or function for a user. The present invention makes use of selector objects, classifier objects, and action objects

10   to provide personalized content and function based on information gathered about a user.

The selector objects provide a mechanism for specifying and managing the actions that are to be taken to respond to a user's request for content/function. The

15   classifier objects provide a mechanism for defining and managing reusable building blocks that the selector objects use to distinguish among different situations so that they can select the correct actions when responding to requests for content/function from users. The action

20   objects identify actions that are to be performed when the action object is invoked.

The present invention may be implemented in a stand alone data processing system or in a distributed data processing system. For example, the present invention

25   may be implemented in a personal computer or in a distributed data processing system in which a server and client device interact. The following is a brief description of each of these possible data processing environments in which the present invention may be

30   implemented.

Figure 1 is a pictorial representation of a distributed data processing system in which the present

Docket No. AUS9-2000-0371-US1

invention may be implemented. Distributed data processing system **100** is a network of computers in which the present invention may be implemented. Distributed data processing system **100** contains a network **102**, which is the medium

5   used to provide communications links between various devices and computers connected together within distributed data processing system **100**. Network **102** may include permanent connections, such as wire or fiber optic cables, or temporary connections made through telephone

10 connections.

In the depicted example, a server **104** is connected to network **102** along with storage unit **106**. In addition, clients **108**, **110**, and **112** also are connected to a network **102**. These clients **108**, **110**, and **112** may be, for

15 example, personal computers or network computers. For purposes of this application, a network computer is any computer, coupled to a network, which receives a program or other application from another computer coupled to the network. In the depicted example, server **104** provides

20 data, such as boot files, operating system images, and applications to clients **108**-**112**. Clients **108**, **110**, and **112** are clients to server **104**. Distributed data processing system **100** may include additional servers, clients, and other devices not shown. In the depicted

25 example, distributed data processing system **100** is the Internet with network **102** representing a worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another. At the heart of the Internet is a backbone of high-speed

30 data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational, and other computer systems, that

route data and messages. Of course, distributed data processing system 100 also may be implemented as a number of different types of networks, such as, for example, an Intranet or a local area network.

5   Figure 1 is intended as an example, and not as an architectural limitation for the processes of the present invention. The present invention may be implemented in the depicted distributed data processing system or modifications thereof as will be readily apparent to those

10   of ordinary skill in the art.

The present invention provides a mechanism for establishing data flow from a trusted server, such as server 104, to a client device, such as client 110, over a non-secure link and still be able to make sure the data

15   has not been changed during transmission. The present invention is applicable to any type of signed and unsigned code that may be transmitted, for example, over the network 102. In the preferred embodiments of the present invention, as described hereafter, a platform independent

20   code will be assumed and specifically, Java code will be assumed for purposes of illustration.

With reference now to Figure 2A, a block diagram of a data processing system which may be implemented as a server, such as server 104 in Figure 1, is depicted in

25   accordance to the present invention. Data processing system 200 may be a symmetric multiprocessor (SMP) system including a plurality of processors 202 and 204 connected to system bus 206. Alternatively, a single processor system may be employed. Also connected to system bus 206

30   is memory controller/cache 208, which provides an interface to local memory 209. I/O Bus Bridge 210 is connected to system bus 206 and provides an interface to

I/O bus **212**. Memory controller/cache **208** and I/O Bus
Bridge **210** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge
214 connected to I/O bus **212** provides an interface to PCI
5   local bus **216**. A modem **218** may be connected to PCI local
bus **216**. Typical PCI bus implementations will support
four PCI expansion slots or add-in connectors.
Communications links to network computers **108-112** in
Figure 1 may be provided through modem **218** and network
10   adapter **220** connected to PCI local bus **216** through add-in
boards.

Additional PCI bus bridges **222** and **224** provide
interfaces for additional PCI buses **226** and **228**, from
which additional modems or network adapters may be
15   supported. In this manner, server **200** allows connections
to multiple network computers. A memory mapped graphics
adapter **230** and hard disk **232** may also be connected to I/O
bus **212** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate
20   that the hardware depicted in **Figure 2A** may vary. For
example, other peripheral devices, such as optical disk
drive and the like also may be used in addition or in
place of the hardware depicted. The depicted example is
not meant to imply architectural limitations with respect
25   to the present invention.

The data processing system depicted in **Figure 2A** may
be, for example, an IBM RISC/System 6000 system, a product
of International Business Machines Corporation in Armonk,
New York, running the Advanced Interactive Executive (AIX)
30   operating system.

With reference now to **Figure 2B**, a block diagram of
a data processing system in which the present invention

may be implemented is illustrated. Data processing
system **250** is an example of a client computer. Data
processing system **250** employs a peripheral component
interconnect (PCI) local bus architecture. Although the
5   depicted example employs a PCI bus, other bus
architectures such as Micro Channel and ISA may be used.
Processor **252** and main memory **254** are connected to PCI
local bus **256** through PCI Bridge **258**. PCI Bridge **258** also
may include an integrated memory controller and cache
10 memory for processor **252**. Additional connections to PCI
local bus **256** may be made through direct component
interconnection or through add-in boards.

     In the depicted example, local area network (LAN)
adapter **260**, SCSI host bus adapter **262**, and expansion bus
15 interface **264** are connected to PCI local bus **256** by
direct component connection. In contrast, audio adapter
266, graphics adapter **268**, and audio/video adapter (A/V)
269 are connected to PCI local bus **266** by add-in boards
inserted into expansion slots. Expansion bus interface
20 **264** provides a connection for a keyboard and mouse
adapter **270**, modem **272**, and additional memory **274**. SCSI
host bus adapter **262** provides a connection for hard disk
drive **276**, tape drive **278**, and CD-ROM **280** in the depicted
example. Typical PCI local bus implementations will
25 support three or four PCI expansion slots or add-in
connectors.

     An operating system runs on processor **252** and is
used to coordinate and provide control of various
components within data processing system **250** in **Figure**
30 **2B**. The operating system may be a commercially available
operating system such as Java OS or OS/2, which are
available from International Business Machines

Docket No. AUS9-2000-0371-US1

Corporation. Java OS is loaded from a server on a
network to a network client and supports Java programs
and applets. An object oriented programming system, such
as Java, may run in conjunction with the operating system
5   and may provide calls to the operating system from Java
programs or applications executing on data processing
system **250**. Instructions for the operating system, the
object-oriented operating system, and applications or
programs are located on storage devices, such as hard
10   disk drive **276** and may be loaded into main memory **254** for
execution by processor **252**. Hard disk drives are often
absent and memory is constrained when data processing
system **250** is used as a network client.

      Those of ordinary skill in the art will appreciate
15   that the hardware in **Figure 2B** may vary depending on the
implementation. For example, other peripheral devices,
such as optical disk drives and the like may be used in
addition to or in place of the hardware depicted in
Figure 2B. The depicted example is not meant to imply
20   architectural limitations with respect to the present
invention. For example, the processes of the present
invention may be applied to a multiprocessor data
processing system.

      The present invention provides a mechanism for
25   applying and managing business classifications for
identifying actions to be performed to generate
personalized content and/or function for a user. The
present invention makes use of selector objects,
classifier objects, and action objects to provide
30   personalized content and function based on information
gathered about a user.

      Figure 3 shows an exemplary diagram illustrating the

Docket No. AUS9-2000-0371-US1

interaction of the selector objects (selectors), classification objects (classifiers) and action objects (actions). The selector objects **310** may be invoked by a business application to perform a selection of actions

5   for personalizing content and/or functionality. The classification objects **320** may be invoked by selector objects **310** for classifying various user data and system data for use in determining actions to be performed for the personalization of the content/functionality. The

10   action objects **330** may be invoked by the selector objects **310** to perform the various actions necessary to provide personalized content/functionality. The action objects **330** may be invoked based on the classification of user data and/or system data obtained from the classification

15   objects **320**.

As shown in **Figure 3**, the selectors **310** may be comprised of any number of selection objects that are defined by a user of the system. In the particular example shown in **Figure 3**, the selectors **310** include a

20   home promo selector **311**, a home masthead selector **312** and an available products selector **313**. The home promo selector **311** selects a promotional advertisement to be provided to a user on a home page of the business web site, the home masthead selector **312** selects a masthead

25   to be displayed to the user on the home page of the business web site, and the available products selector **313** selects the products to be provided to the user as available products.

The classifiers **320** provide mechanisms for defining

30   and managing reusable building blocks that selectors use to distinguish among different situations so that they can select the correct actions when responding to

Docket No. AUS9-2000-0371-US1

requests from users. The classifiers **320** describe a variety of business conditions and a set of named variants of the business situation called classifications. For example, there might be a

5 classifier named "Season" defining classifications for spring, summer, fall and winter.

In the particular example shown in **Figure 3**, the classifiers **320** include a time classifier **321**, a customer level classifier **322**, and an investment level classifier

10 **323**. The time classifier **321** is used to determine in which class the current time falls, i.e. spring, summer, fall, winter, holiday season, weekend, weekday, etc. The customer level classifier **322** determines a current customer level classification for the user requesting

15 content. The investment level classifier **323** determines a current investment level of the user.

Classifiers can be combined to further qualify the business situation. Combining classifiers further constrains when a corresponding action will occur. For

20 example, an administrator may include "Weekpart is Weekend" in addition to "Season is Holiday" as classifiers for identifying an action to be performed. Thus, only when the current situation can be classified as a weekend and a holiday season will the corresponding

25 action be performed.

The classifiers are usable in many different selectors **310**. Thus, for example, the home promo selector **311** and the available products selector **313** may both use the time classifier **311** to identify actions to

30 be invoked. Thus, only one instance of the time classifier **311** is required for use by a plurality of different selector objects **310**.

Docket No. AUS9-2000-0371-US1

The actions **330** are used to perform various actions for personalizing information content and functionality of the business application, such as a business web site and the like. The actions **330** are invoked by selectors

5   **310** which use the actions **330** to perform a specified function, such as displaying a particular advertisement, displaying a list of high value overstock items, displaying a list of gold customer spring season items for sale, checking order status, calculating a credit

10   limit, determining a current available credit, playing a music file, and any other function that may be performed in a data processing environment.

In addition to specifying actions that are performed when a classification applies, a selector **310** may also

15   include actions that are always performed regardless of whether any classifications apply. These are referred to as "Always" actions. Moreover, the selector **310** may include actions that are performed only when no classifications apply. These are referred to as

20   "Otherwise" actions.

In the example shown in **Figure 3**, the actions **330** include a platinum spring sale action **331**, a gold spring sale action **332**, a high value overstock items action **333**, and a default home promo content action **334**. The actions

25   **330** may be invoked by a plurality of different selectors **310**. Thus, the same action **330** may be associated with a home promo selector **311** and an available products selector **313**. Furthermore, the same selector **310** may make use of the same action **330** for a plurality of

30   classifications of one or more classifiers **320** in which the user data and/or system data may be classified. In this way, only one instance of the action **330** is required

for the same action to be performed in a plurality of different situations.

Thus, the present invention compartmentalizes the personalization of the generation of information content

5   and functionality into selectors, classifiers, and actions. By compartmentalizing the personalization, it is easier for an administrator of the business application to determine the interaction of the personalization components that make up the business

10   application. In other words, if an action is changed due to, for example, a different business methodology being adopted, it is easy for the administrator to determine how this change will affect the system by determining which actions are associated with various selectors and

15   how those actions are invoked by the selectors based on the classifications of the classifiers. In a similar manner, classifiers and selectors may be modified, based on changes in desired operation of the business application, in a straight forward and easy manner such

20   that the impact of such changes on the operation of the business application can be readily recognized.

For example, if the gold spring sale action **332** were modified to perform a slightly different function than was previously performed, it can be determined from the

25   architecture shown in **Figure 3** that this change will impact the selectors **310** that invoke the gold spring sale action **332** based on classifications in the time classifier **321** and the customer level classifier **322**. This is because the selectors **310** invoke the gold spring

30   sale action **332** if the time of the year is spring and the customer level is determined to be gold.

Similarly, if the customer level classification were

Docket No. AUS9-2000-0371-US1

modified to provide an additional customer level
classification, such as silver customer, it can be
determined that the selectors 310 that invoke the
customer level classifier 322 may result in the customer

5   being a silver level customer. In this case, a new
action may need to be defined for performing
personalization of content for the silver level customer.
However, an existing action could be associated with the
silver level classification in any of the selectors 310

10   that utilize the customer level classifier 321. Thus,
the administrator may define a new silver level customer
by modifying the customer level classifier 321 and adding
one or more actions for the silver level customer in all
selectors that use the customer level classifier 321.

15   In the prior art, in order to perform modifications
of the business application logic, an administrator must
traverse each of the levels of if-then-do statements to
determine where to make the modifications and how to make
the modifications. Furthermore, the administrator must

20   again traverse each of the levels of if-then-do
statements for each possible combination of input
parameters to determine if the modifications adversely
affect other parts of the business application. Thus,
the present invention provides a much more easily

25   manipulated architecture for implementing business logic
in a business application and for making modifications to
that business logic.

        Figure 4 is an example of an operational outline of
a selector in accordance with the present invention. The

30   operations shown in Figure 4 are performed using the
classifier objects and action objects described above.

        As shown in Figure 4, the selector 400 is identified

Docket No. AUS9-2000-0371-US1

as "Promotionals." The selector **400** uses the classifier "Season" to determine a classification of the current situation. Similarly, the selector **400** uses the classifier "Weekpart" to determine the current part of

5 the week for the Holiday season. The classifier "Season" has as least the following possible defined classifications: Holiday, Winter or Fall since these are explicitly called out. The "Weekpart" classifier has at least the following possible defined classifications:

10 weekend since it also is explicitly called out.

Using the selector **400**, the current situation is analyzed to determine first, if it is currently a Holiday season, Winter season or Fall season. This determination is made using the "Season" classifier object. If it is a

15 Holiday season, it is determined whether it is a weekend or not. This determination is made by the "Weekpart" classifier object. Based on these classifications, various content are retrieved by the selector using the action objects "WeekendHolidayPromos,"

20 "WeekdayHolidayPromos," "sortByInventory," "CoolWeatherPromos," and "LowSeasonPromos."

Thus, for example, if the season is a holiday season and the weekpart is a weekend, the "WeekendHolidayPromos" action object will be invoked. Similarly, if the season

25 is "Winter or Fall", the "CoolWeatherPromos" action object will be invoked. If the season is neither a holiday nor Winter or Fall, the "LowSeasonPromos" action object is invoked by the selector. Regardless of what the ultimate classification applies to the current

30 situation, the action object "filterOutNoStockItems" is always invoked by the selector.

When executing a selector like that shown in **Figure**

4, all of the classifications in an encountered classifier are evaluated for applicability, from top to bottom. Thus, rather than having to traverse all defined classifiers and all of the classifications in each of the

5   defined classifiers, as would be required in conventional if-then-do decision engines, the present invention is able to ascertain which subset of the classifiers to execute and which actions should be executed by the selector based on a positive classification match using

10 the subset of classifiers.

    Figures 5-7 illustrate a portion of a personalization tool for specifying the personalization parts of a business application using the architecture outlined above. It should be appreciated that the tool

15 depicted in **Figures 5-7** is used only for illustrative purposes and is not meant to be limiting in any way. Those of ordinary skill in the art will appreciate that the functionality of the tool depicted in **Figures 5-7** may be implemented in many different ways without departing

20 from the spirit and scope of the present invention.

    Figure 5 shows a first view of the personalization tool in which users, actions, classifiers and selectors are defined. The users section stores user information for users that have been registered with the tool. This

25 user information may include any type of information that generally describes the registered user and what the user is doing. Thus, the user information may include, for example, age, race, sex, marital status, annual income, credit card numbers, product preferences, address and

30 other contact information, and the like, as well as what has been read or purchased.

    The actions section contains all of the action

Docket No. AUS9-2000-0371-US1

objects that have been defined for the personalization
tool. These action objects, as discussed above, perform
various actions, such as providing various combinations
of information content, which may be invoked by one or
5   more of the selectors. The action objects that have been
defined in the depicted example include "Platinum Spring
Sale," "Gold Spring Sale," "High Value Overstock Items,"
and "Default Home Promo Content."

The classifiers section contains all of the
10   classifier objects that have been defined for the
personalization tool. These classifier objects, as
discussed above, identify classifications in which a
requesting user and/or the current system situation may
be classified. The classifier objects may be invoked by
15   one or more of the selectors. The classifier objects
that have been defined in the depicted example include
"Timeframe," "Customer Level," "Investment Level," and
"Customer Interest."

The selector section contains all of the selector
20   objects that have been defined for the personalization
tool. The selector objects, as discussed above, perform
the function of implementing the overall business logic
that is to be performed. The selector objects invoke
classifier objects and action objects to perform the
25   business logic. This may include, for example, providing
personalized information content, via a customized web
page, to a user based on the user information for that
user.

The particular embodiment of the tool shown in
30   **Figure 5** is that of an expandable tree. New items may be
added to the tree by selecting the section in which the
new item is to be added, and choosing an add function
from, for example, a menu (not shown) using an input

device such as a mouse or other pointing device. Once
the add function is initiated, the user must enter a
description of the new item to be added. If this new
item is an action object, for example, the user my need
5   to add a name for the action object and a function to be
performed by that action object. For example, the action
object "Platinum Spring Sale" may have a definition that
includes the name of the action object, an action type
(such as Catalog Selection), a catalog identifier (such
10   as Spring), and a selection criteria (such as
category=Promotional & Price >= 24.99). Thus, using the
"Platinum Spring Sale" action object, all products in the
Spring catalog that are promotional items and cost $24.99
or more will be provided to the requesting user.

15   If the new item is a classifier object, the user may
need to specify a name of the classifier object, the
classifications associated with the classifier object,
and the criteria for being classified in each of the
classifications. For example, for the classifier object
20   "Timeframe" there may be four classifications: Spring,
Summer, Fall, Winter. The criteria for being classified
in the Spring classification may be, for example,
today.month >= 4 & today.month <= 6. Thus, if today's
month is April, May or June, the Spring classification
25   will be selected.

If the new item is a selector object, the user may
need to define a name for the selector object, the
classifier objects, and action objects to be invoked when
certain classifications do and do not apply, and the
30   like. The selector object may include "Always" actions
and "Otherwise" actions as described above.

Likewise, existing items may be modified by
selecting them using the pointing device and modifying

the items definition. Similarly, items may be deleted
from a section based on a selection of the item and the
selection of a delete function using, for example, a menu
and a pointing device. The interface for performing the
5   addition, modification and deletion of items is similar
to user interfaces generally known in the art and is
therefore, not described in further detail.

Figure 6 illustrates a definition of a
classification within a classifier object in accordance
10   with the present invention. As shown in Figure 6,
classifications may be nested such that very specific
personalization of the business application may be
obtained. In the example shown in Figure 6, the selector
object "Home Promo" contains the classifier object
15   "Timeframe" which contains the classifications Spring,
Summer, Fall and Winter. The Spring classification
further includes a Customer Level classifier object which
has classifications of Platinum, Gold, Silver, and
Bronze. The Other classification is used to identify
20   actions to perform when none of the other classifications
in the Customer Level classifier apply.

Further, as shown in Figure 6, in the selector Home
Promo, the classification Platinum for customer level has
three actions associated with it: Platinum Spring Sale,
25   High Value Overstock Items, and Gold Spring Sale. In
other words, if the classifications of Spring and
Platinum apply to the user data and system data, these
three actions will be invoked by the selector. Thus, the
products that are selected by each of these action
30   objects will be presented to a requesting user if the
current time frame is spring and the requesting user's
customer level is platinum.

Also, as shown in **Figure 6**, the end of the list of classifications for Customer Level includes the classification Other. This construct provides a place to put action objects for cases in which a classifier does

5 not recognize the current situation as something specific, i.e. in the depicted example, the customer level is not determined to be Platinum, Gold, Silver or Bronze. Thus, if the time frame is spring but the customer level is not one of platinum, gold, silver or

10 bronze, the selector will invoke actions associated with the classification "other."

In addition, the Home Promo selector object contains the *Always* object. An *Always* object can occur on any non-terminal node in the selector objects subtree.

15 *Always* objects are terminal nodes whose associated actions are always executed in addition to whatever action objects are invoked based on the classifications selected. As shown in **Figure 7**, the *Always* object contains the action "Default Home Promo Content." Thus,

20 the default home promo content will always be provided to the requesting user in addition to the content obtained from action objects invoked based on classification. The Always object is a convenient place to put ordering and filtering algorithms prior to returning selected content

25 to the user.

Figure 8 is a flowchart outlining an exemplary operation of the present invention when generating a personalized business application. As shown in **Figure 8**, the operation starts with defining the business logic

30 that is to be implemented by the business application (step **810**). Then, the various classifier objects and classifications that are to be used in the business logic

are defined (step **820**). These describe the various characteristics that may cause the business logic or function to vary for a user of the business application. The action objects are defined (step **830**). These usually

5 represent subsets of content, business functions, or common functions. The selector objects are then defined (step **840**) by associating actions with classifications. The operation then ends.

Figure 9 is a flowchart outlining an exemplary
10 operation of a personalized business application of the present invention when determining what action objects to invoke based on a request from a user. As shown in **Figure 9**, the operation starts with receiving a request for information content from a user (step **910**). A
15 selector object is invoked by the business application (step **920**). The selector object invokes one or more classifier objects which determine which classifications the user and the current system situation fall under (step **930**).

20 The action objects associated with the applicable classifications are invoked (step **940**). Any *Always* or *Otherwise* action objects are then invoked (step **950**). The operation then ends.

Thus, in summary, with the method and apparatus of
25 the present invention, the set of actions needed to retrieve and organize the required content for a particular content request are selected and executed based on the concept of classifying the current situation, e.g., the requesting user attributes and the
30 current system setting, along any number of predefined dimensions. This contrasts with designs in which a large bucket of rules is executed for each request, each rule

consisting of a condition part that determines whether
the rule applies for the current request and an operation
part that is executed if the condition is true.

The definition of what dimensions of classification
5   there are and what distinctions are drawn during the
process of classification is defined by the business
application administrator. For example, an administrator
might define customer levels as one way to classify
things and distinguish platinum, gold, silver and bronze
10   level customers based on whatever criteria makes business
sense. Once a classification definition is in place, it
may be used and reused, along with other classifications,
to be associated with actions that select the appropriate
content. In order to describe what actions to take under
15   a variety of business conditions, an administrator
chooses a classifier to be used to assess the business
situation, selects the relevant classifications and
associates one or more actions with each classification
to be invoked by the selector.
20   Thus, the present invention provides a mechanism by
which personalization of content and functionality may be
performed without having to traverse large if-then-do
based decision chains. This is due to the
compartmentalization of the business application into
25   selector objects, classifier objects, and action objects.
Only those classifier objects invoked by the selector
object are traversed. Similarly, only those action
objects corresponding to an applicable classification are
traversed.
30   The mechanism of the present invention allows for
ease of modification by modifying only those objects that
are necessary to implement the desired business logic.
Thus, a single action object may be modified in order to

make a modification in the way a plurality of selector objects operate.

The impact of the modification on other sections of the business application can be easily discerned by

5 identifying the selector objects that invoke the modified objects. Thus, for example, it can be determined that a change in an action object will affect the operation of multiple selector objects and thus, if the affect on one or more of these selector objects is unwanted, a new

10 action object may be generated to compensate for the unwanted operation.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary

15 skill in the art will appreciate that the processes of the present invention are capable of being distributed in a form of a computer readable medium of instructions and a variety of forms, and that the present invention applies equally regardless of the particular type of

20 signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media such a floppy disc, a hard disk drive, a RAM, and CD-ROMs and transmission-type media such as digital and analog communications links.

25 The description of the present invention has been presented for purposes of illustration and description, but is not limited to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in

30 the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for

Docket No. AUS9-2000-0371-US1

various embodiments with various modifications as are
suited to the particular use contemplated.

Docket No. AUS9-2000-0371-US1

CLAIMS:

What is claimed is:

1.   A method of creating a personalized content delivery
5 business application for personalizing content delivery
to a requesting user, comprising:
defining one or more classifier objects, the
classifier objects containing one or more
classifications;
10   defining one or more action objects, the one or more
action objects being associated with the one or more
classifications and identifying functions that are to be
performed; and
defining at least one selector for invoking the one
15 or more classifier objects and for invoking the one or
more action objects based on the one or more
classifications being applicable to a current situation.

2.   The method of claim 1, wherein the one or more
20 classifier objects are reusable with a plurality of
different selectors.

3.   The method of claim 1, wherein the one or more
action objects are reusable with a plurality of different
25 selectors.

4.   The method of claim 1, wherein the steps of defining
are performed using a personalization tool.

30 5.   The method of claim 4, wherein the personalization
tool provides a tree-like display of the one or more
classifier objects, the one or more action objects and
the at least one selector.

Docket No. AUS9-2000-0371-US1

6.   The method of claim 1, wherein the one or more classifier objects are specified to determine at least one classification in which user data is classified, and

5   wherein the at least one selector associates one or more action objects based on the classification of the user data.

7.   The method of claim 6, wherein the one or more

10   classifier objects are specified to determine at least one classification in which system data is classified, wherein the at least one selector associates the one or more actions based on both the determination of at least one classification of the classifier object in which the

15   user data is classified and the determination of at least one classification of the classifier object in which the system data is classified.

8.   The method of claim 1, wherein the one or more

20   action objects are specified to perform at least one function for personalizing information content to be delivered to a user.

9.   The method of claim 8, wherein the at least one

25   function includes at least one of selecting and formatting information for display to the user.

10. A method of personalizing content delivery by an application to a user, comprising:

30   applying at least one classifier object to user data;

     determining at least one classification of the classifier object in which the user data is classified;

Docket No. AUS9-2000-0371-US1

and

invoking at least one action object based on the determination of at least one classification of the classifier object.

5

11. The method of claim 10, further comprising:

invoking at least one Always object, the Always object defining at least one action object that is to be invoked regardless of the determination of the at least

10 one classification of the classifier object.

12. The method of claim 10, wherein determining at least one classification of the classifier object in which the user data is classified includes:

15 determining if the user data is not classified in any of the at least one classification of the classifier; and

if the user data is not classified in any of the at least one classification of the classifier, invoking at

20 least one action object associated with an Otherwise object, the Otherwise object defining at least one action object that is to be invoked when the user data is not classified in any of the at least one classification of the classifier.

25

13. The method of claim 10, further comprising determining at least one classification of the classifier object in which system data is classified, wherein invoking at least one action object includes invoking at

30 least one action object based on both the determination of at least one classification of the classifier object in which the user data is classified and the determination of at least one classification of the

Docket No. AUS9-2000-0371-US1

classifier object in which the system data is classified.

14. The method of claim 10, wherein the at least one action object performs at least one function for

5 personalizing information content to be delivered to a user.

15. The method of claim 14, wherein the at least one function includes at least one of selecting and

10 formatting information for display to the user.

16. A computer program product in a computer readable medium for creating a personalized content delivery business application for personalizing content delivery

15 to a requesting user, comprising:

first instructions for defining one or more classifier objects, the classifier objects containing one or more classifications;

second instructions for defining one or more action

20 objects, the one or more action objects being associated with the one or more classifications and identifying functions that are to be performed; and

third instructions for defining at least one selector for invoking the one or more classifier objects

25 and for associating the one or more action objects based on the one or more classifications being applicable to a current situation.

17. The computer program product of claim 16, wherein

30 the one or more classifier objects are reusable with a plurality of different selectors.

18. The computer program product of claim 16, wherein

Docket No. AUS9-2000-0371-US1

the one or more action objects are reusable with a
plurality of different selectors.

19. The computer program product of claim 16, wherein
5 the computer program product is a personalization tool.

20. The computer program product of claim 19, further
comprising fourth instructions for providing a tree-like
display of the one or more classifier objects, the one or
10 more action objects and the at least one selector.

21. An apparatus for creating a personalized content
delivery business application for personalizing content
delivery to a requesting user, comprising:
15   a first means for defining one or more classifier
objects, the classifier objects containing one or more
classifications;
        a second means for defining one or more action
objects, the one or more action objects being associated
20 with the one or more classifications and identifying
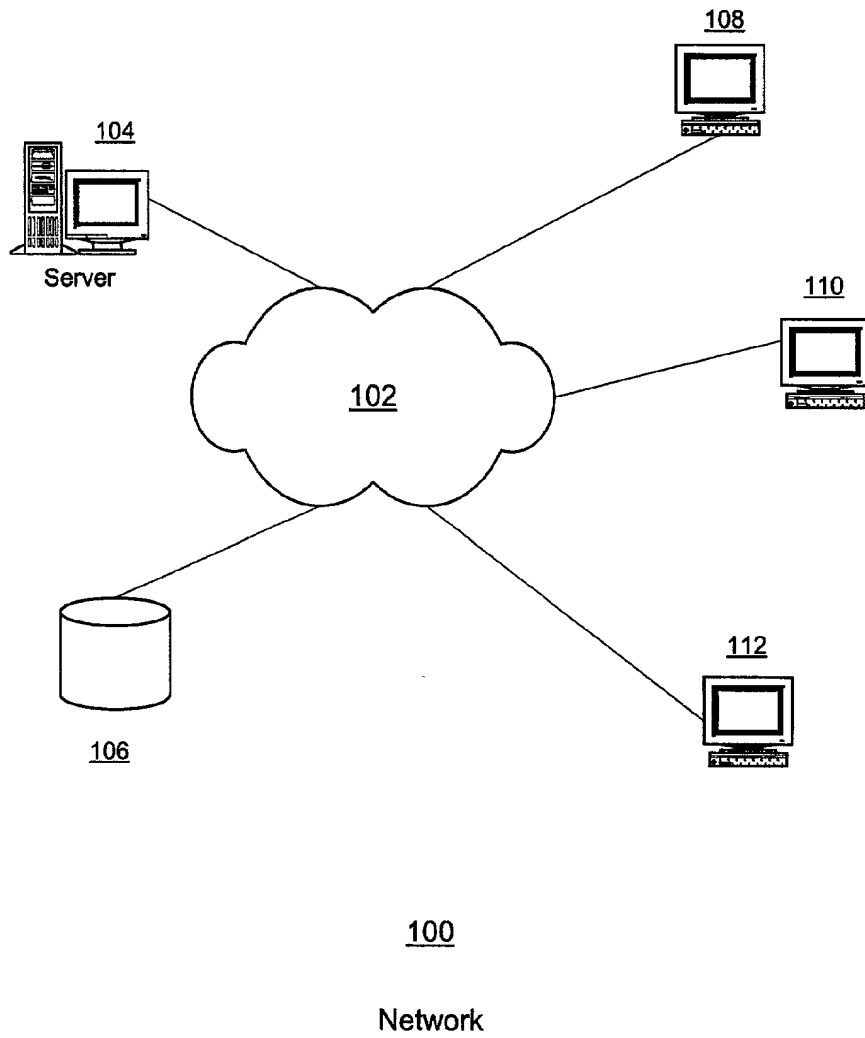functions that are to be performed; and
        a third means for defining at least one selector for
identifying the one or more classifier objects and for
associating the one or more action objects based on the
25 one or more classifications being applicable to a current
situation.

Docket No. AUS9-2000-0371-US1

ABSTRACT OF THE DISCLOSURE

5

METHOD AND APPARATUS FOR PERFORMING PERSONALIZATION BASED ON CLASSIFICATION

A method and apparatus for personalizing information content for delivery to a requesting user is provided. With the method and apparatus, a set of actions needed to

10   retrieve and organize requested content for a particular content request are selected and executed based on the concept of classifying the current situation, e.g., the requesting user attributes and the current system setting, along any number of predefined dimensions. The

15   definition of what dimensions of classification there are and what distinctions are drawn during the process of classification is defined by the business application administrator. Once a classification definition is in place, it may be used and reused, along with other

20   classifications, to be associated with actions that select the appropriate content. In order to describe what actions to take under a variety of business conditions, an administrator chooses a classifier to be used to assess the business situation, selects the

25   relevant classifications and associates one or more actions with each classification to be invoked by a selector.

108

104

Server

110

102

112

106

100

Network

Figure 1

Processor
202

Processor
204

206
System Bus

Memory
Controller/
Cache
208

I/O Bridge
210

Local Memory
209

PCI Bus Bridge
214

216
PCI Bus

Modem
218

Network Adapter
220

I/O Bus 212

Graphics Adapter
230

PCI Bus Bridge
222

226
PCI Bus

Hard Disk
232

PCI Bus Bridge
224

228
PCI Bus

200
Server

Figure 2A

AUS9-2000-0371-US1

250
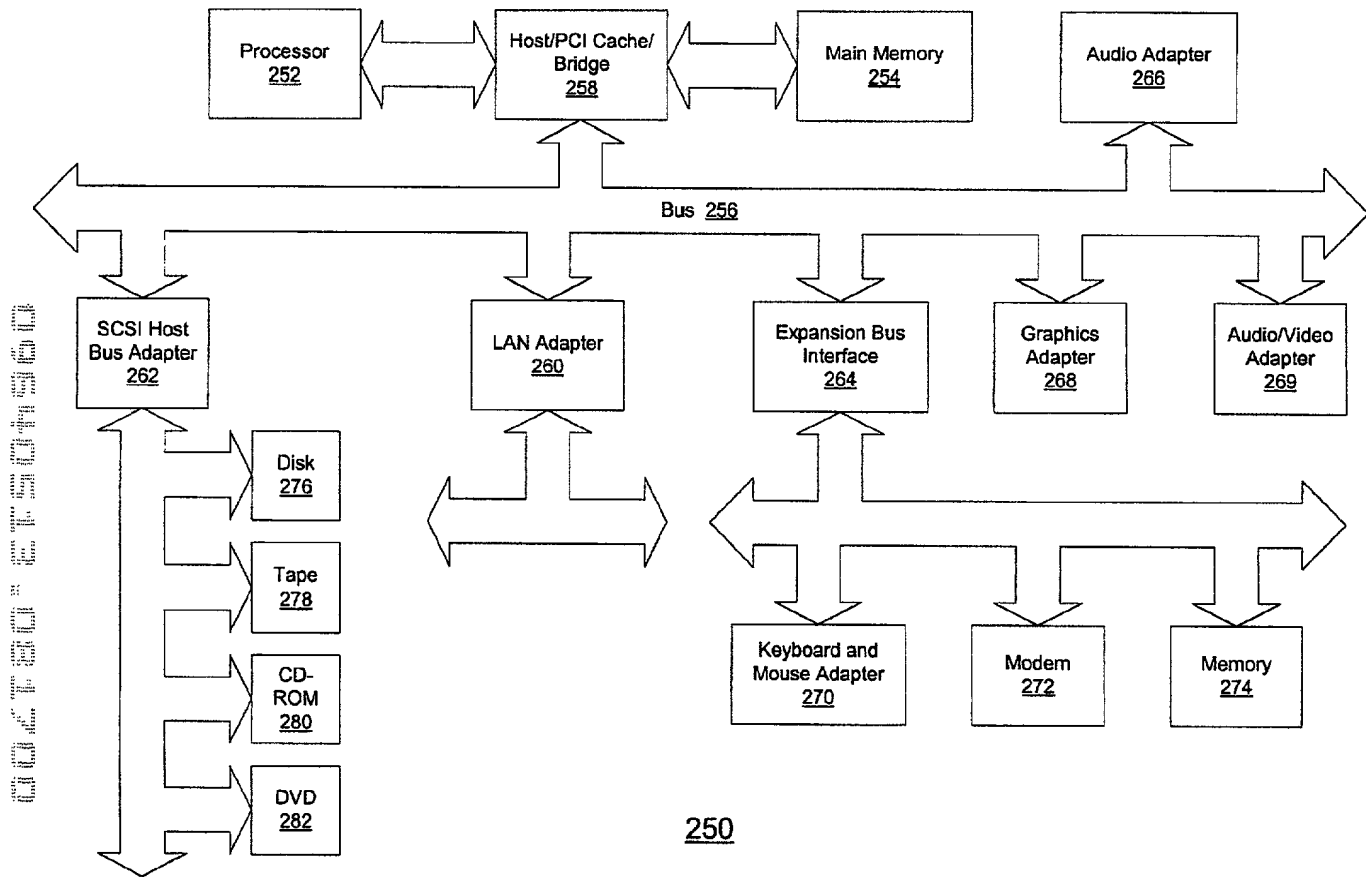
Figure 2B

AUS9-2000-0371-US1
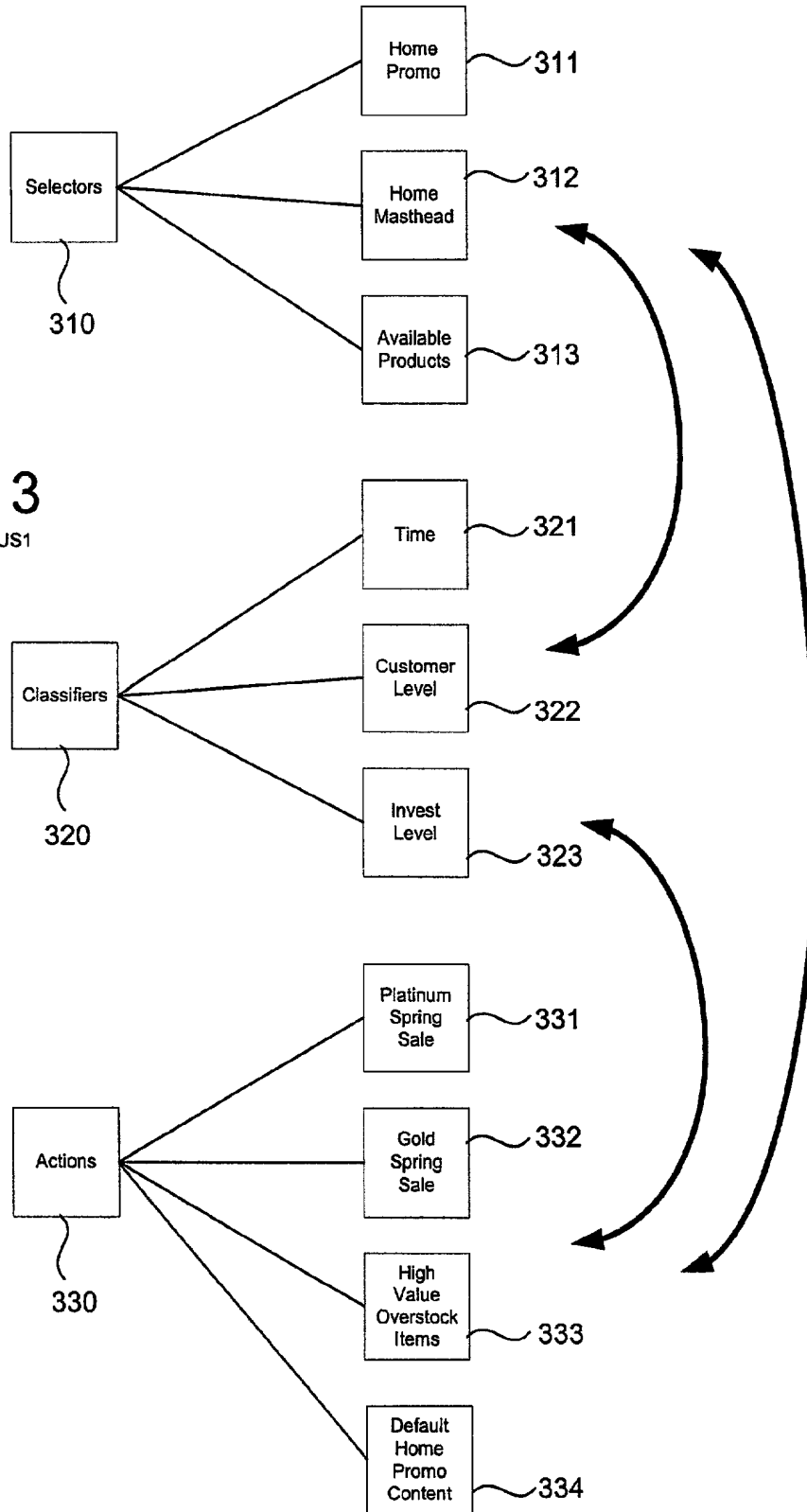
Figure 3

AUS9-2000-0371-US1

Selectors — 310

- Home Promo — 311
- Home Masthead — 312
- Available Products — 313

Classifiers — 320

- Time — 321
- Customer Level — 322
- Invest Level — 323

Actions — 330

- Platinum Spring Sale — 331
- Gold Spring Sale — 332
- High Value Overstock Items — 333
- Default Home Promo Content — 334

Promotionals
    for **Season**
        Holiday
            for **Weekpart**
                Weekend
                    select **WeekendHolidayPromos**
                otherwise
                    select **WeekdayHolidayPromos**
                always
                    sortByInventory
        Winter or *Fall*
            select **CoolWeatherPromos**
            sortByInventory
        otherwise
            select **LowSeasonPromos**
    always
        filterOutNoStockItems

Figure 4

AUS9-2000-0371-US1

```
[+]— Users

[-]————Actions

         ———— Platinum Spring Sale

         ———— Gold Spring Sale

         ———— High Value Overstock Items

         ———— Default Home Promo Content


[-]——— Classifiers

         [+]— Timeframe

         [+]— Customer Level

         [+]— Investment Level

         [+]— Customer Interest


[-]——— Selectors

         [+]— Home Promo

         [+]— Home Masthead

         [+]— Home Menu

         [+]— Available Products
```
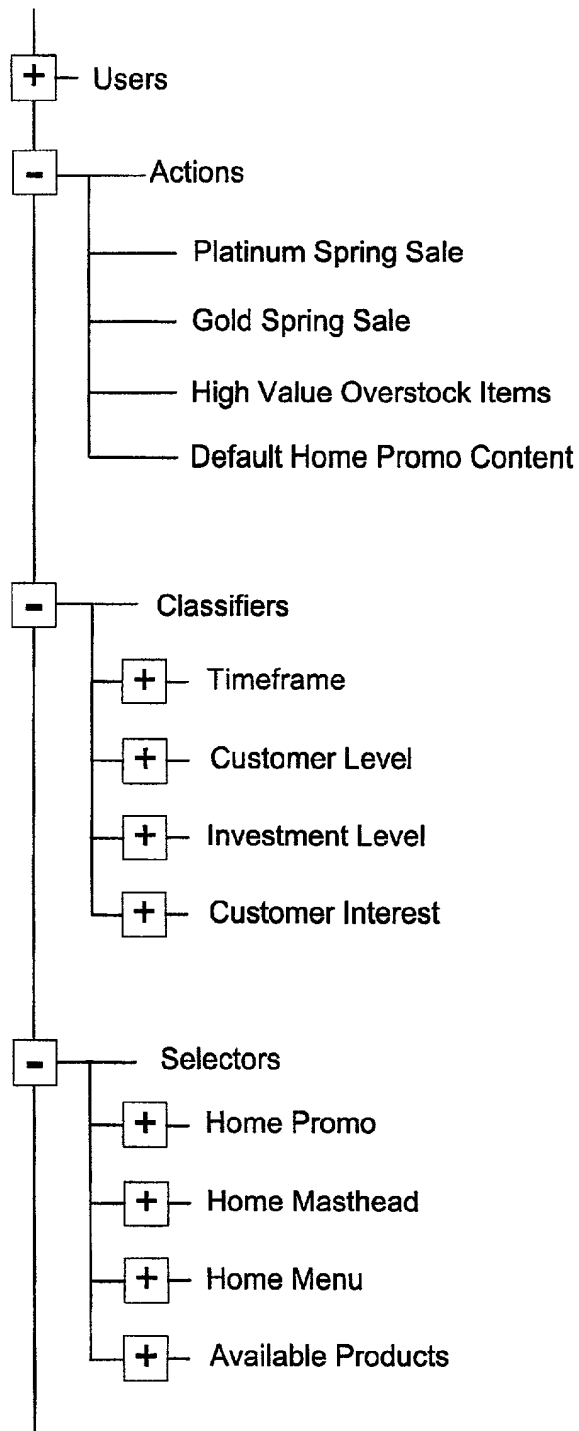
Figure 5

AUS9-2000-0371-US1

```
├── [-]─ Selectors
│    └── [-]─ Home Promo
│         └── [-]─ Timeframe
│              ├── [-]─ Spring
│              │    └── [-]─ Customer Level
│              │         ├──── Platinum
│              │         ├──── Gold
│              │         ├──── Silver
│              │         ├──── Bronze
│              │         └──── Other
│              ├── [+]─ Summer
│              ├── [+]─ Fall
│              └── [+]─ Winter
│         └──── Always
```
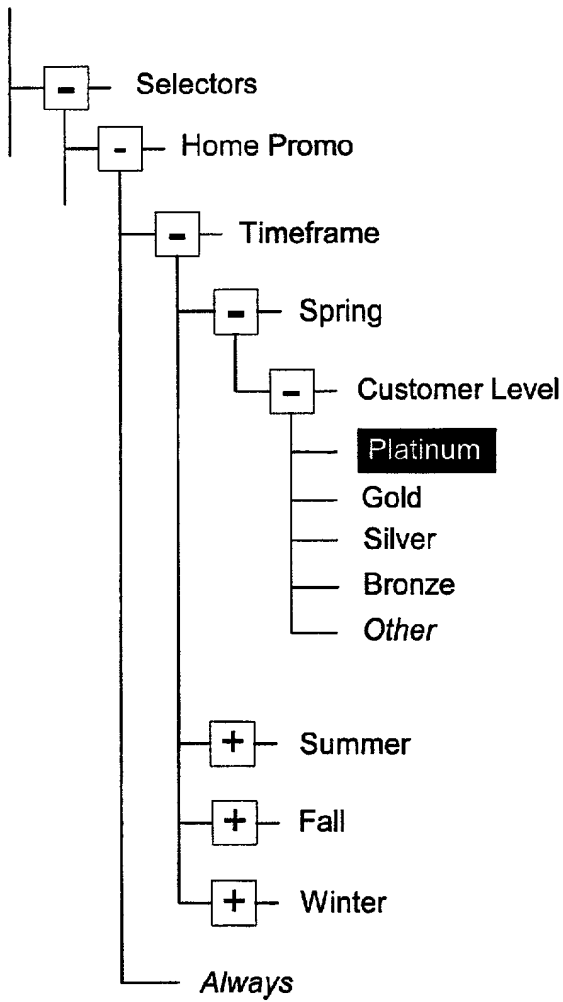
ACTIONS
Platinum Spring Sale
High Value Overstock Items
Gold Spring Sale

Figure 6

AUS9-2000-0371-US1

```
┌─┬─ Selectors
│ └─┬─ Home Promo
│   └─┬─ Timeframe
│     ├─┬─ Spring
│     │ └─┬─ Customer Level
│     │   ├── Platinum
│     │   ├── Gold
│     │   ├── Silver
│     │   ├── Bronze
│     │   └── Other
│     ├─[+]─ Summer
│     ├─[+]─ Fall
│     └─[+]─ Winter
│     └── Always
```
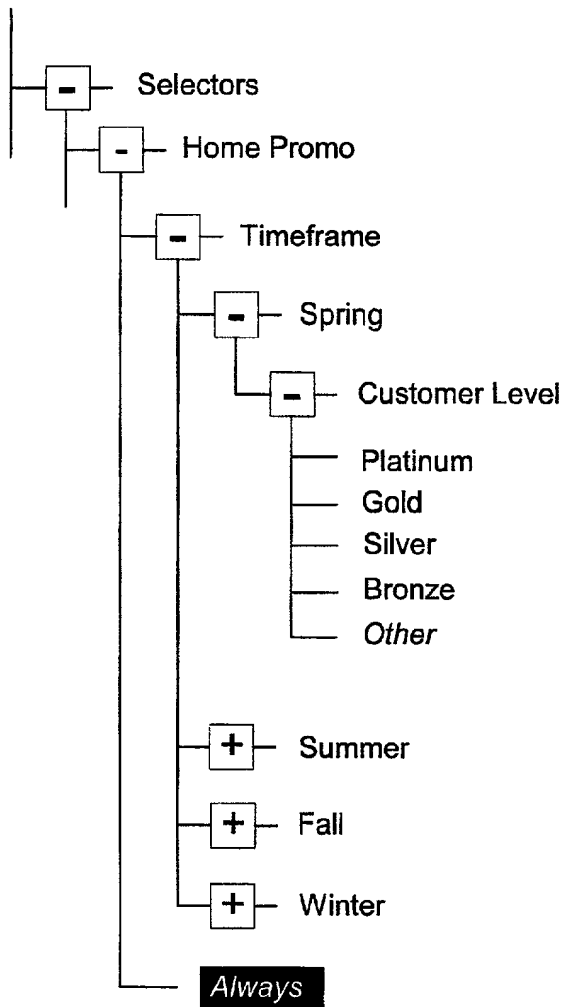
ACTIONS
Default Home Promo Content

Figure 7

Figure 8

AUS9-2000-0371-US1

```
        ┌─────────┐
        │  Start  │
        └─────────┘
             │
             ▼
     ┌──────────────┐
     │    Define    │──── 810
     │Business Logic│
     └──────────────┘
             │
             ▼
     ┌──────────────┐
     │    Define    │──── 820
     │  Classifier  │
     │   Objects    │
     └──────────────┘
             │
             ▼
     ┌──────────────┐
     │ Define Action│──── 830
     │   Objects    │
     └──────────────┘
             │
             ▼
     ┌──────────────┐
     │    Define    │──── 840
     │   Selector   │
     │   Objects    │
     └──────────────┘
             │
             ▼
        ┌─────────┐
        │   End   │
        └─────────┘
```
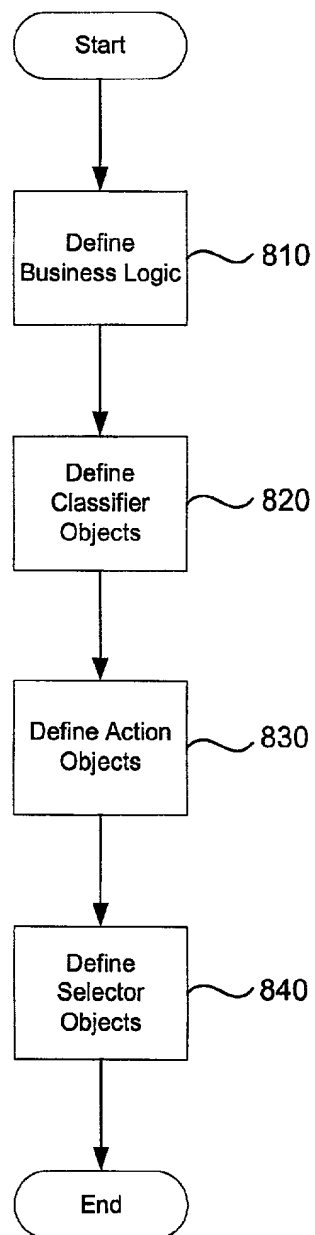
Figure 9

AUS9-2000-0371-US1

```
          ┌─────────┐
          │  Start  │
          └─────────┘
               │
               ▼
       ┌───────────────┐
       │    Receive    │
       │  Request From │ ─── 910
       │     User      │
       └───────────────┘
               │
               ▼
       ┌───────────────┐
       │    Invoke     │
       │   Selector    │ ─── 920
       │    Object     │
       └───────────────┘
               │
               ▼
       ┌───────────────┐
       │ Invoke One or │
       │More Classifier│ ─── 930
       │    Objects    │
       └───────────────┘
               │
               ▼
       ┌───────────────┐
       │    Invoke     │
       │  Associated   │ ─── 940
       │ Action Objects│
       └───────────────┘
               │
               ▼
       ┌───────────────┐
       │  Invoke Any   │
       │   Always and  │ ─── 950
       │   Otherwise   │
       │    Objects    │
       └───────────────┘
               │
               ▼
          ┌─────────┐
          │   End   │
          └─────────┘
```
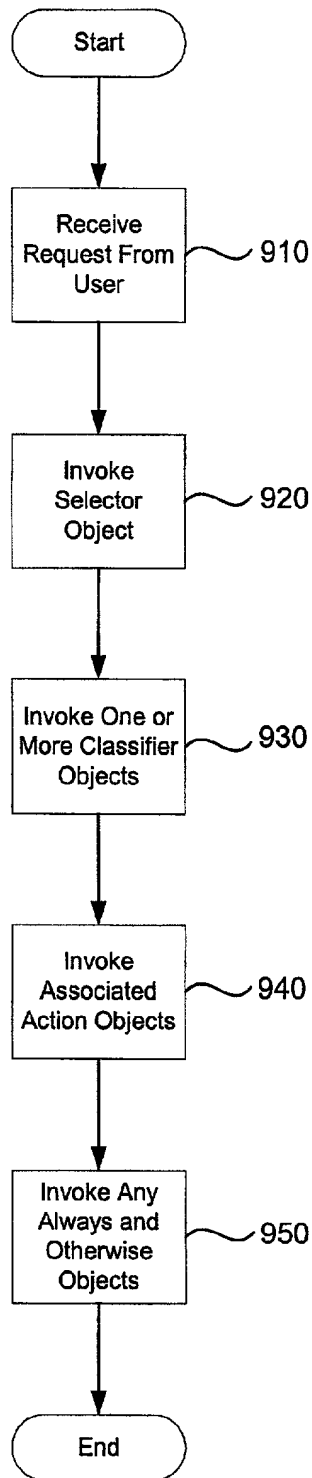
DECLARATION AND POWER OF ATTORNEY FOR

PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD AND APPARATUS FOR PERFORMING PERSONALIZATION
BASED ON CLASSIFICATION

the specification of which (check one)

X_ is attached hereto.

__ was filed on _____
as Application Serial No._____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):   Priority Claimed

_____   _____   _____   ___ Yes___ No
  (Number)   (Country)   (Day/Month/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____   _____   _____
(Application Serial #)   (Filing Date)   (Status)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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